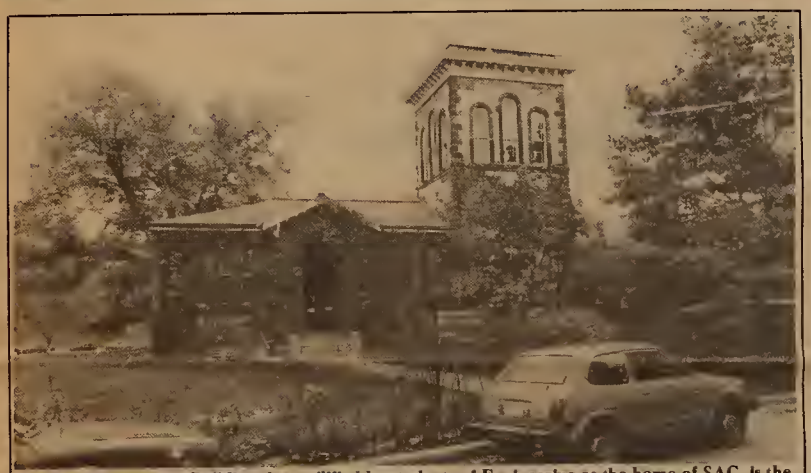
Engineering a Future

the CANNON

October 31, 1980 | University of Toronto Engineering Society | Vol. III No. 3



The Old Observatory Building, long vilified by students of Engineering as the home of SAC, is the predecessor of one which stood on what is presently Engineering territory near the site of the Sandford Fleming building. For a full history of the observatory, see page four.

Engineering PEY's

by John Samochin

Professional experience. To the majority of undergraduate engineering students, this term implies engineering-related employment in the summer months between school years, However, this year has seen the introduction of a new program in the Faculty of Applied Science and Engineering. The Professional Experience Year program, or PEY, allows second year students the option of working for sixteen months, starting immediately after second year, before returning to their third year studies.

The PEY program started two years ago as a pilot project within the Department of Mechanical Engineering. Eight students entered the program and were employed by companies such as General Motors of Canada, De Havilland, and Ontario Hydro. Last year the program was expanded, with the Atomic Energy Board, Shell Canada, and PetroCanada also hiring PEY students. Encouraged by the results of the program, the co-ordinator of the project, Prof. D. McCammond of Mechanical Engineering, oversaw PEY's adoption Faculty-wide.

Certainly the PEY program is not recommended for all students, since most are satisfied with the professional experience they get through summer employment and wish to finish their schooling in four years. However, some students seek additional experience in what an engineer in their field actually does, or perhaps insight into how certain industries operate. The PEY program will serve to clarify the students' opinions of their academic pursuits; the students are exposed to the reality of their chosen profession. Prof. McCammond projects student involvement in PEY should hover around ten percent of the second year enrolment. If many more students applied, third year class numbers would fluctuate. In order to attract student interest, every department in the Faculty has a PEY representative who has already spoken to his second year classes.

continued page 3

This Month

OEDC

The University of Waterloo Engineering Society is hosting the second annual Ontario Engineering Design Competition. The experience and the prizes are well worth the effort. page 6

The Establishment

If you've ever had a question about the Society and not known whom to ask, you have no more excuses. page 7

Grads' Prospects Look Good

by Rick Botman

If any capable engineers are having difficulty finding a job these days, its probably because they aren't looking far enough. This is the word from the Association of Professional Engineers of Ontario (APEO), the organization responsible for registering and representing professional engineers on a provincial basis. The Association offers an Employment Advisory Service for registered engineers and publishes salary surveys annually.

While a slowdown of the economy and thus new construction starts in the traditional Eastern markets may signal a diminished demand for graduates of the big three disciplines, Civil, Electrical, and Mechanical, opportunities abound for engineers of all kinds in most regions of Canada. Here in Toronto most of the large employers are in a stable, but limited growth pattern. Consequently, their hiring programs are basically maintenance plans, with new staff acquired to plug holes and work on new projects. "On the frontier" of the booming Western petro-chemical industry however, many companies are experiencing such rapid expansion that there results stiff competition for the top engineering students. And they don't just want Mining or Chemical engineers; these and the other industries that follow economic prosperity require grads of all disciplines, although in smaller numbers. What must be considered by the graduating student is that less than half of new jobs are filled directly through university employment services.

Co-ordinating graduates and employers seems to be a problem of divergent expectations. Many young engineers, presumably packed with knowledge but with only a few summers of related experience, are still "wet behind the ears" when it comes to understanding the opportunities and operations within their field. While high starting salaries indicate an unparallelled demand for engineers compared with most bachelor-degree grads, it's fact that most employers spend at least one year training their highly priced junior engineers. If the graduate is unsure of his or her direction, this training year may prove to be an expensive exercise for the company. Not only has it limited productivity from the trainee, but it must deal with the high marketability of their now experienced engineers in a highly competitive field at the end of the training. Hence the attraction of educational systems like Waterloo's Co-op program, which offers the employer a graduate already familiar with the field and quite likely even the job, after a low-risk summer trial. Toronto has

continued page 3

RESSA Results

The 1980 Regional Engineering Students Societies Association Conference, held October 3-5 at Ecole Polytechnique in Montreal, was a great success, according to the Engineering Society delegates. The conference is held annually to allow engineering schools from Ontario and Quebec to meet and discuss mutual problems and possible solutions.

One of the discussions at the conference centred on publications and, according to Cannon editor John Voss, Toronto had a lot to add to that discussion. "Many schools are having great difficulty finding advertising revenue and wanted to know how the Toike managed to be so successful financially. We also discussed staffing problems, and difficulties such as the Toike has had with adverse

continued page 3

the CANNON

Editorial Offices
3rd Floor, Old Metro Library
20 St. George Street
University of Toronto
Toronto, Ontario
M5S 2E4 978-5377

Editor John Voss

Contributors

Steve Roberts
June Li
Diane Kapica
Randy Sinukoff

THE CANNON is a publication of the University of Toronto Engineering Society. It is published monthly to announce Eng. Soc. events, discuss Faculty and University matters, and present technical information of interest to Engineering undergraduates. Subscriptions are available, call Ella at 978-2917. Anyone interested in helping with THE CANNON is most welcome.

THE CANNON encourages submissions; please type or write legibly. Deadline for articles is one week before publication date, notices and letters by 5:00 p.m. the Friday prior to publication. Comments on THE CANNON or articles appearing in it are appreciated. The editors reserve the right to edit letters for brevity.

Letters

The Editor:

I am writing in comment to the pamphlet "A Prescription for Higher Education", published by the OFS and distributed by SAC. Everyone is screaming for more money, but have they ever stopped to think where it is going to come from?

The pamphlet states that a parent earning $11,000 with two children in school, is expected to contribute $1500 to their education. Thousands of students have been squeezed by OSAP living allowances that fell far short of the cost of living. Under the new student aid program, those who need more than four years of schooling are cut off grants. My nose bleeds for them.

In 1952, my father got off the boat from Europe, penniless, but intent on getting an education. He didn't qualify for any grants. His parents sent him no money. Yet he made it through one of the hardest courses on the UofT campus. It took him more than just four years. Through changing courses, he lost a year. Through being broke, he had to take a year or two off to earn money to go back. But he made it, with no help from anybody else, because that was what he really wanted to do. I am fortunate that I don't have it that hard. My father (who does earn more than $11,000 per year), is supporting me. But I know I could do it myself, with no help from anybody else, because that is what I really want to do.

I feel no pity for those who feel they don't get enough money from OSAP. I heard one silly fellow complain if OSAP didn't come through he would have to sell his car. Is OSAP supposed to support the Education of those who are serious enough to work for it, or is OSAP supposed to provide a lazy bastard with the luxury of a car? I don't own a car, I can't afford it. But I have friends on OSAP who do. Small wonder OSAP is often called a WinStereo grant.

People these days are getting too soft. They want to have everything handed to them on a silver platter. Even without student loans and frozen tuition fees, the path exists for a serious student to get an education if he's determined enough to work for it. Let him join a Co-op programme, such as they have at Waterloo. If he's determined to get the quality education offered at UofT, let him take a year off now and then to earn money for school. It's people who always scream for more money that are the cause of inflation.

Emil Joannou
Eng.Sci. 8T1

Where Do You Stand?

Recently, the University of Toronto Status of Women Committee published a pamphlet entitled "Stop sexism in the Toike". In it, the UTSWC outlines six demands to the Toike including the establishment of an Editorial Board , and amendment of the Society Constitution to ensure the abolition of sexist, racist, and anti-gay material in the paper. They also seek a representative on the board to serve in an advisory capacity.

This is the most recent volley in a continuing battle over the Toike and its content. Continuously, for many years, the Society has been inundated with complaints from various groups around campus and beyond. Asidefrom the Toike editors and the Eng. Soc. officials directly involved, very few engineers have taken interest enough to express their views. The Toike is published by the Society, presumably as a service to its members. Do engineers like what they are getting for their money?

Clearly the UTSWC demands are unreasonable. The Engineering Society must manage its own affairs. An editorial board is unnecessary; the Communications Committee has been working on a new Publication policy since September. The UTSWC seeking a position on the committee is analogous to a foreign citizen demanding a seat in parliament, and equally unacceptable.

The motivation behind these demands is not unreasonable, however. It is true that the Toike has been and continues to be sexist, and worse, it is often not even funny.There can be no doubt that a need for a campus humour publication exists. Taking ourselves too seriously poses a great danger. With effort, the Toike can be a true humour publication, and as such a welcome contribution to the University of Toronto.

If the Toike is to change it will require constructive criticism, not outraged diatribe. It will require people willing to give time and effort to improving the material, and to developing new ideas.

The Society Constitution states that the Toike Oike should bring credit to the Society. Do you feel creditted? The Society needs your ideas, and your opinions. Where do you stand?

Consider the Options

Engineering students, both graduates and undergraduates, are in great demand by employers. This translates into marvellous opportunities for students, and not just in terms of salaries and financial benefits.

Today's engineering student has a much greater opportunity to be selective about employment, and can therefore entertain a number of options when considering a career.

Tuition fees and educational expenses being what they are, many undergraduates look strictly for high-paying course-related jobs. Fortunately, these are not that difficult to find. The Career Counselling and Placement Centre has published a salary survey that shows salary offers made to students for curse-related summer employment. An engineering student having completed second year in April 1980 earned $252 a week on average, while a Bachelor of Science student earned $188, and a general arts student $159.

Aside from jobs in industry, a number of students consider jobs with their department, working with professors. The pay is not usually as high, because university budgets are tight, but it is a perfect opportunity to sample what an academic career might be like.

Some students enjoy travel, so what could be nicer than a course-related job overseas? The International Association for the Exchange of-Students for Tech nical Experience (IAESTE) can place you in an engineering job in one of forty-seven countries. Walter Van Veen is a grad student in Geotechnical Engineering who worked in Spain in the summer of 1979 on the construction of a power plant. He says the biggest advantage to IAESTE is the chance to experience another lifestyle, and the drawbacks are the short work period and the low pay. Nonetheless, he enjoyed his summer in Spain and recommends the programme. Students must apply early if they hope to be accepted. Information is posted on the Employment Committee bulletin board in the Engineering Society offices.

Graduates in engineering will no doubt be tempted by the high salaries offered by industry. Some students, however, should perhaps give consideration to furthering their education.

There is a severe shortage of technical people with advanced degrees in Canada. This may be due to the popular myth that holders of Masters or Doctorates cannot find jobs. Since the student is more specialized, it may take longer to find a well-suited position, but the jobs are there.

Is the time spent worth the financial sacrifice? It is true that a grad student foregoes an $18,000 a year salary to pursue grad work, but he or she can very probably receive as much as ten thousand dollars as a grad student. Grants of $8500 are available from the National Science and Engineering Research Council (NSERC) and most departments have teaching assistant positions available that pay about $750 a term.

Once the student graduates with a Master of Applied Science degree, he or she can expect to earn $1500 to $2000 more per year than a Bachelor's holder. A Ph. D. will earn another $500 on top of that. Clearly, the financial return is not immediate, but holders of higher degrees generally rise faster in the organisation and promotion means rapid salary growth.

The Faculty now offers a combined Bachelors-Masters programme leading to a Master of Engineerig degree. The M. Eng. is generally obtainable in one year and requires a project instead of a thesis. More specific information is available from the various departments.

And what about a career in academics? A small number of students will choose to pursue research at a university. The UofT has traditionally supplied a large number of engineers who serve as academics at other universities, besides those who remain here.

If a student does choose industry, selection of a field is still difficult, and quite important because few people can function efficiently in a job they don't enjoy. Jan Kloosterhuis of the Placement Centre suggests technical sales as a career that many overlook. "The popular conception is that sales is boring," she says, "but this isn't necessarily true." "Because of a new graduate's naivete in the industrial world, many opportunities in lesser known fields are neglected".

It is a good time to be an engineering student, because the employment scene might very well be described as the student's market. Advantages of this opportunity should be taken to carefully weigh all the options, and choose career directions wisely.

the CANNON

Join the growing group of people working with the Cannon. Leave your name and number in the Cannon mailbox in the Engineering Stores.

Conference

continued from page1

reaction to its content." Voss was "shocked" to learn that two years ago the editor of the engineering paper at the University of Western Ontario was suspended by the Dean for material he printed. "Our Dean would never consider such action," Voss said.

The University of Waterloo Engineering Society is launching a publication similar to the Cannon, to be called the Iron Warrior. Efforts are going to be made to circulate newspapers among the various Societies so that students in both Ontario and Quebec can be kept informed about what is going on among engineering undergraduates.

Also discussed was a program initiated at the Ecole Polytechnique to orient new students. Each class of freshmen is assigned two or three upperclassmen to act as counsellors through the first year. The program has proved very successful.

In another workshop, plans were made for the Canadian Congress of Engineering Students conference to be held at Queen's University in early January. Some delegates, specifically those from Waterloo, were interested in the CCES assuming a bigger role for engineering students in Canada.

A number of the ideas discussed in Montreal could see useful application in our Society, the Eng. Soc. delegates felt.

The University of Guelph is hosting this year's Association of Professional Engineers of Ontario --Undergraduate Engineering Society conference November 28-30. The theme of the meeting is the legal and social implications of professional engineering. Eng. Soc. delegates to the conference have not been named.

Advancement the Key

continued from page 1

moved towards meeting these needs, with work experience requirements for it's undergrads and the Professional Experience Year program. Still, many graduates have difficulty formulating realistic long-range strategies while on the bottom rungs of their profession. We need some sort of insight into the dynamics of engineering as a career.

"Upward mobility" and "career advancement" are the governing factors in engineering salaries in Ontario. Figures obtained from the APEO 1980 Report on Engineers' Salaries indicate that while starting salaries are increasing at a rate slightly higher than inflation, the true worth of an engineer is demonstrated by her or his ability to rise within the organization. In a field where rapid technological advances and increasing numbers of fresh, primed graduates create strong pressures from the bottom of the managment pyramid, obsolescence is a reality for people, as well as their tools.

For those with an economic interest, the average salary of engineers in Ontario graduating in 1980 was $18,500, an increase of 12.1% over last year's 1979 graduate salary average of $16,500. This year however, '79 grads average $19,600, for a raise of 20 percent. The value of promotion is indicated by the average 1980 salary of junior engineers who graduated in 1973, which was $19,600, while the average for all levels of engineers from the classes of '73 was $27,900. Engineers typically regarded as fully qualified and experienced yet not directly involved in management, with a range of about seven to fifteen years of experience were earning an average of $27,900 in 1980, while in '79 they averaged $25,600. In the upper reaches of engineering managment and administration, salaries averaged about $43,700, although the distribution ranged from $36,900 to better than $50,000. You'd better not put that down payment on the house in Rosedale yet though, it took them a median of 26 years to achieve that level, and virtually none of the grads since 1970 have gotten that far.

The data presented represents the salaries of 15,800 engineers employed by 220 major companies and government agencies in 1980. Many of the companies surveyed are large national r international firms, including Bell, Domtar, Imperial Oil, and a host of others. The salaries quoted were arrived at statistically, and should not be considered as a recommended salary scale.

PEY Program

continued from page 1

Industrial response to PEY is good this year. General Motors has made six offers, De Havilland four, and Ontario Hydro seeks from eight to fifteen. As in the past, Prof. McCammond foresees no difficulty employing the student applicants. In its brief history, PEY has had as many employment offers as interested students.

Since the first students to participate in PEY only returned to classes this year, it is premature to say whether or not they had difficulty readjusting to their studies. Certainly the program does not make third year easier, and applicants to PEY should have good academic standing.

The PEY program is not a reply to engineering Co-op programs offered at other institutions. It is a totally voluntary option open to students who want more work experience in their academic program. It must also be remembered that employers often prefer hiring graduates that have practical experience. and *have worked with* their company. In this respect, PEY helps companies find full time personnel.

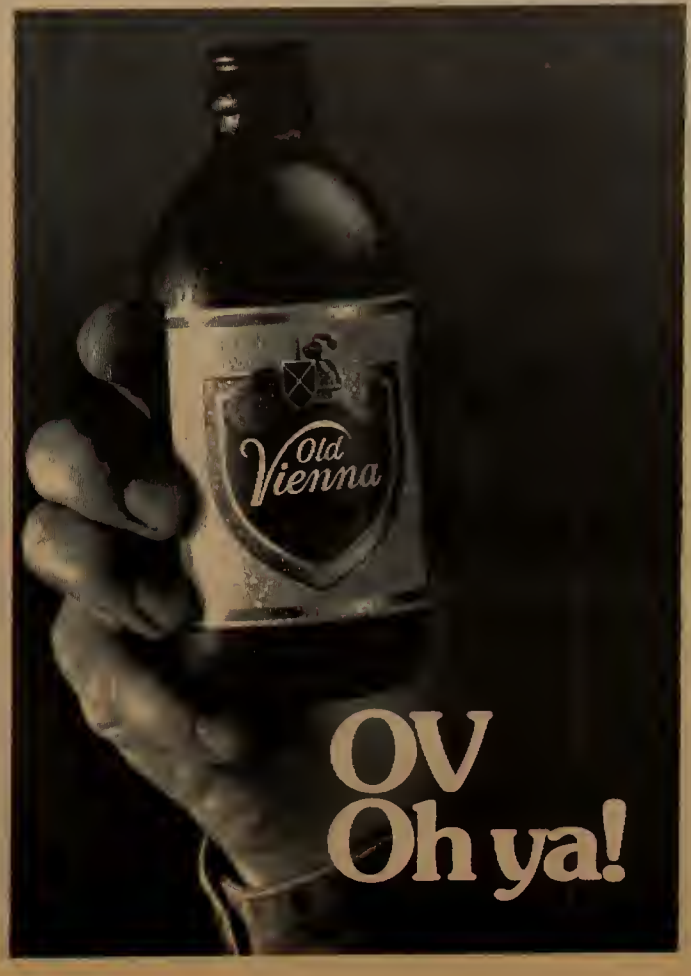
The ONTARIO ENGINEERING DESIGN COMPETITION

OEDC

TROPHIES, CASH, AND RECOGNITION AWARDED

ENTRY DEADLINE: November 14, 1980

for more imformation,see Ella in the Stores



The Old Observatory's

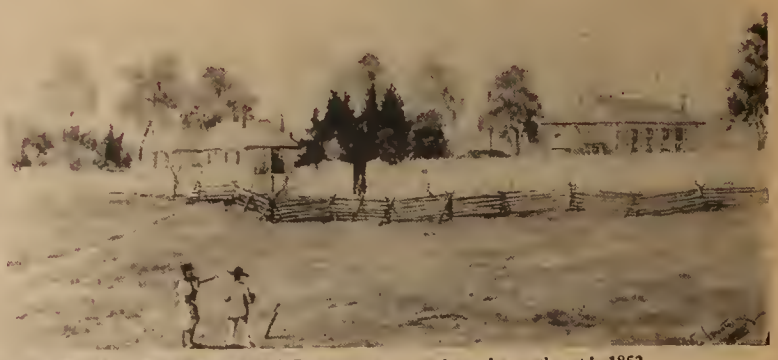
by Prof. I. R. Dalton
and Prof. G. D. Garland

Nobody who looks at the little old stone building to the east of University College which currently houses the Students' Administrative Council offices, and which bears on its door-post an Ontario Government plaque in honour of somebody named Sir John Henry Lefroy, could fail to notice the building's most prominent feature. The dome, with its ever-changing colour scheme stamps the building plainly as having once been an observatory. Little would the beholder suspect that that quaint but somewhat derelict building is a direct descendent of one which housed the first scientific institution in Canada, one whose work made fundamental and important contributions to the knowledge of terrestrial magnetism, one which was the parent and original home of the national Meteorological and Time Services for Canada and one whose history is tied in closely with that of the Sandford Fleming building, currently being rebuilt after the disastrous fire which occurred in February of 1977.

In the summer of 1840, long before there were any buildings on the present main campus, the British Government acquired from the University of King's College a two and one half acre parcel of land, now covered by large parts of Convocation Hall and tbe Sandford Fleming Building, and built on it a Magnetic and Meteorological Observatory. So important did this institution become, both in the world-wide study of terrestrial magnetism and meteorology, and in Canada's own development, that all who pass this way should be aware of its existence and history.

The founding of the Toronto Observatory dates from a period of intense interest in the earth's magnetic field during the first half of the nineteenth century. The previous two centuries had seen the reconnaissance mapping of the strength of the field over the globe, and the growing recognition that the field changed with time in a complicated way. During the 1830's, the great mathematician Carl Friedricb Gauss was working on an analysis of the field, and at the same time was organizing a group of colleagues in Europe to make regular measurements of the changes with time of the magnetic force. The "universal scientist", Alexander von Humboldt, friend and patron of Gauss, recognizing that magnetic observatories distributed over the entire globe were essential for proper understanding of tbe magnetic phenomena, wrote in April of 1836 to the Duke of Sussex, President of the Royal Society in London, to urge that Britain establish such observatories. In his lengthy letter, Humboldt listed a number of British possessions in which magnetic observatories would be desirable. The Royal Society endorsed Humboldt's suggestions and recommended to the government the funding of observatories at four places: Capetown, St. Helena, Hobart (Tasmania, or van Dieman's Land as it was then known) and somewhere in Canada. The sites in Canada and Tasmania would be points of the strongest magnetic field on the globe, and St. Helena the least, and Capetown had exhibited some long-term effects of special interest, effects "which in their nature, are not improbably intimately connected with the causes of the magnetism of the globe itself," in the opinion of Edward Sabine, a distinguished British scientist and Arctic explorer, who had been chosen as the director of the project. Operation of the observatories was entrusted to personnel of the Royal Artillery, except for the Tasmania station which would be operated initially by the Royal Navy in conjunction with their Antarctic Expedition. The instruments were conceived, designed, built and calibrated in the shops of the Royal Society, and procedures for their use were worked out by a Dr. Lloyd of the new magnetic observatory at Dublin University.

The magnetic field is of course a vector field, requiring for its complete determination a measurement of the intensity and a measurement of the direction, which may be in two parts, the component parallel to the earth's surface (the so-called "declination") and the angle of dip with respect to the surface (the "inclination"). All these measurements utilize weak bar magnets in sensitive suspensions. Because the effects to be measured are extremely weak, the instruments have to be extremely sensitive and precise if useful and reliable results are to be obtained, and all other hardware, not only in the instruments themselves but also in the building and from some distance outside, must be of some completely non-magnetic metal, such as brass. Because of their great delicacy and sensitivity, the instruments must be very firmly mounted, each on its own stone pier, with no mechanical connection to any other part of the building, and to ensure a minimum of interference during their operation, they have to be read through telescopes similarly mounted a little distance away.



The fog Observatory and Director's Residence, as seen from the southeast in 1852.

The original intention was to set up the Canadian station near Montreal. Accordingly, in September of 1839, the young Lt. Charles James Buchanan Riddell made his way there, to be followed on a slower boat by three non-commissioned officers, to act as his staff, and two gunners for servants, along with their families, and about fifty cases of instruments and supplies weighing nearly ten tons. One of the original mercury barometers, after nearly one hundred and twenty-five years of continuous service, now rests in honourable retirement in the lobby of the Atmospheric Environment Service building at Downsview.

The Montreal site proving unsuitable because of the large masses of magnetic rock nearby, Riddell moved his whole detachment to Toronto, intending to build on a part of the Garrison Reserve back of Fort York, but this site was too swampy. Settling for temporary accommodations' in the fort itself, he began taking observations in January of 1840, meanwhile searching for a more satisfactory location. Feeling that a site west of the original King's College Building (now Queen's Park) would be "one of the most eligible situations...in the neighbourhood of Toronto", he approached the Bursar for a piece of land. He considered as "highly desirable that a building of this description should be placed in a position where, in the event of the Observatory being given up by the government, it would still be available for scientific purposes."

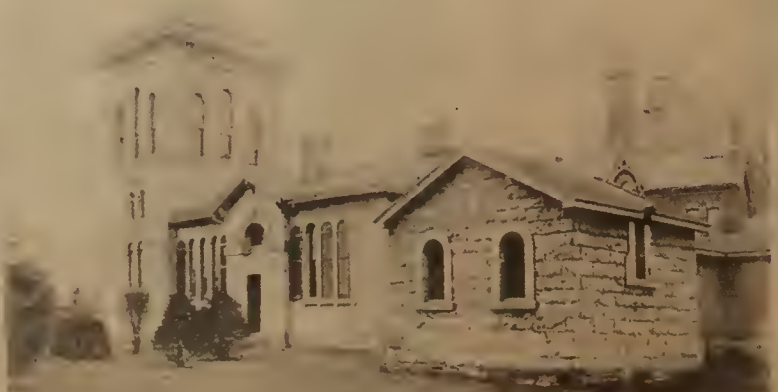
Suitable stone not being immediately available, Riddell built his observatory of logs, which he felt would be "equally advantageous for preserving a uniform temperature", and covered it with rough plaster on the outside. Nails were of copper or zinc, and other hardward of brass. Iron stoves were out of the question; the office was heated by a wood-burning fireplace but the instrument room had no means of heating it whatsoever, as the temperature gradients might have upset the delicate calibration of the instruments.

The instrument room, the heart of the establishment, was set with its long axis parallel to the magnetic meridian, which at that time apears to have been about one-half a degree west of the true north (King's College Road, by contrast, runs about sixteen degrees west of north). A few feet south of the main building, a little round room housed the transit telescope, used for observing the times when the sun and various stars crossed the meridian. This gave the absolute reference timing needed for the observations, but also served to give correct time to the local community and later to the whole country. (The observatory's clocks had been calibrated by reference to the observatory at Boston by the simple and basic procedure of transporting a set of chronometers from the one to the other.) Thermometers were mounted under the louvred sun-shades on the north wall of the building and wind instruments on a tower twenty feet high built on top of the woodshed beside the door on the west side. The Observatory went into full operation in September of 1840. A water colour painting of it as it appeared from the southeast in 1852 is reproduced here.

Lt. Riddell had to abandon his assignment and return home in 1841, to become Major Sabine's assistant director. Capt. John Henry Lefroy, just twenty-four years old, was transferred from his original posting at St. Helena to take his place. Six months after his arrival in 1842, he set out on a two-year extended tour through the interior of the country by Hudson's Bay Company canoe and snowshoe, making a magnetic and meteorological survey right up to the mouth of the Mackenzie River. Lefroy remained as Director of Toronto Observatory until 1853 when the British Government terminated their participation on the project.

Apparently at Lefroy's suggestion, the Canadian Government took over the Observatory in 1853, retaining the original military staff but putting J.B. Cherriman, Professor of Natural Philosophy of the University in temporary charge. It was at that point that the Observatory was rebuilt in stone, to a design by Cumberland and Storm, later to become the architects for University College. (Cumberland's own house, south of the present Galbraith Building, was built in 1860.) A later photograph of the Observatory is shown.

Regular reports on the variations in the strength and direction of the magnetic field at Toronto were appearing in the international scientific literature by 1841. So encouraging were the results that the project, originally guaranteed funding for only three years, was promised support until 1853. In these early years, persons involved in Canada were observers rather than analysts, and the great contributions of the Toronto Observatory were made through



The stone Observatory from the southwest after the dome and telescope were added in 1881. The room in the foreground was used for the measurement of magnetic declination. The building in the background is the School of Practical Science.

Noble History

publications by Edward Sabine in England. In 1857, Sabine wrote to express "well-deserved recognition of the pains which have been bestowed by the successive Directors of the Toronto Observatory and their Assistants...to determine these data with a precision which is greatly in advance of preceding experience". It must be remembered that in those early years, there was no automatic recording. An observatory depended upon the faithfulness of its staff to take observations, night and day, winter and summer, at agreed intervals, sometimes as short as five minutes!

As early as 1852, Sabine recognised, from the Toronto records, that the magnetic variation can be divided into a regular daily cycle, and an irregular portion. The latter, he showed to correlate remarkably closely with the number of sunspots, whose cyclic nature had been recognized just one year earlier. Thus, the control exerted by solar disturbances on the earth's environment became established. Even more remarkable for the time was Sabine's recognition in 1856 of the moon's influence. Taking nine years of hourly observations at Toronto, Sabine averaged the values of the declination in groups, corresponding to the elevation of the moon, or lunar hour angle. Again the correlation is striking, establishing an influence of the moon on the magnetic field of the earth. (Sabine postulated that the moon must be slightly magnetic to cause such effects, but it had to wait until the Apollo moon shots to prove him wrong and to confirm a more modern theory, namely that the effect is the result of gravitional tides in the ionized layer of the earth, the resulting currents causing an ascillatory magnetic field component.) These two major contributions firmly established the Toronto Magnetic Observatory in the scientific world.

As the University began to grow, starting with the construction of the main building (University College) in 1856, it began also to encroach on the Observatory. The Director at that time, Professor Kingston, wrote to the Vice-Chancellor to complain of a rumoured plan to let the Cricket Club use the land just to the south of the Observatory:

"I earnestly hope that so extraordinary a result may never be realized and that what I have heard relative to the expectation of the club will prove to have been a mere rumour...

The contiguity of a cricket field to an observatory is highly objectionable. There is always a danger that balls may fly into the enclosure or even into the building itself and break or damage the instruments...Cricket matches commonly attract crowds of idle and vicious persons likely to cause much annoyance and injury by their intrusion. The row and tumult inseparable from public games are unfavourable to the quiet and sense of security demanded for the successful conduct of delicate experiments"

At this period, there was very little collection of meteorological data outside of Toronto and a few smaller centres. With the approach of Confederation, Prof. Kingston began developing a scheme for a national service. In 1871, he received a substantial grant from the new Federal Government to further his project, and by the time of his retirement in 1880 he had the satisfaction of seeing his dream a working reality, with headquarters in his Toronto Observatory.

In 1877, the School of Practical Science was built right against the eastern boundary of the Observatory property, and it affected the measurements in two ways. First it changed the wind pattern, invalidating the wind instruments, so that the instruments had to be removed from the Observatory tower and placed on the S.P.S. roof. Second, the iron used in its construction affected the magnetic measurements slightly.

It was in 1881 that the Observatory acquired its astronomical telescope, a good six-inch refractor from Thomas Cooke of England, and the now-famour dome. Astronomers all over the world were looking forward to December 6, 1882, when the next transit of Venus across the sun would provide a new opportunity to refine their estimate of the earth's distance from the sun, still annoyingly imprecise despite the careful analysis of the three previous transits, in 1761, 1769 and 1874. The measurement would require many coordinated observations, from many locations, of the exact instants of contact of the edges of Venus's silhouette with the edges of the luminous disc of the sun, and Canadian observations were expected to be of particular value. The Director, Charles Carpmael, bought the telescope for $1,890.71. had a stone column built inside the tower for $317,06 and the wooden dome for $70. Unfortunately, on the day in question, the sky was too cloudy at Toronto, but the results from other centres around the world were not very satisfactory anyway. As there has not been a transit of Venus since nor will there be one for about another twenty-five years, different approaches have to be employed to obtain this parameter.

The next major project for the Observatory was to obtain more precise geographical coordinates for the transit peir, which is of course the reference point for all time determinations. The original longitude estimate had been refined in 1857 using the newly invented telegraph to give time comparisons accurate to the nearest second of time, roughly one quarter of a mile. Tn 1883 the Toronto and McGill observatories, taking advantage of a new U.S. Government survey and again using the telegraph to make time comparisons of extreme accuracy, estblished the longitude of the Toronto instrument -- the pillar that stands outside the Sandford Fleming Building is in its original location oand on its original base -- to within 0.01 seconds of time, which is about 0.15 seconds of arc, or about ten feet of length at this latitude. Astronomical measurements were taken to establish the latitude with nearly equal precision, making this pier the only point in the vicinity ol Toronto whose location was accurately known, not only at that time but for many years afterward. Meanwhile, in a speech to the Canadian Institute in Toronto in 1879, Sandford Fleming had proposed a system of standard time zones for the whole globe which would produce order out of the chaos of local , regional and railway time standards that had persisted throughout the world to that point. His proposal was enthusiastically promoted by the Canadian Government, and in 1884, his plan was adopted in most countries, essentially as we have it today. The reference meridian was chosen as that of Greenwich, England, and the Toronto Observatory lies 17 min. 25 sec. west of the standard meridian for this zone (passing roughly through Cornwall), which is 5 hours behind Greenwich.

The beginning of the end for the magnetic studies at Toronto came with the electrification of the street railways in 1892. The vibration of the instrument magnets caused by the cars, and the influences of the currents on those magnets, increased to the point where measurements could only be taken on Sundays, when the cars were not running, but in 1897 Sunday operation of streetcars was approved and the Toronto Magnetic Observatory, as such, was out of business. The magnetc observations were moved to Agincourt, but the Meteorological and Time Services remained for a time.

By 1903, the University was eyeing the Observatory property as a site for the new Convocation Hall and Physical Laboratories, and agreed to supply in exchange a new lot at Bloor and Devonshire Place, but until the new quarters could be built the staff had to stay put. When construction began in 1906, the Director reported that the site was ruined "as a suitable exposure for meteorological instruments" and by 1907 he was complaining that:

"Dust enters by every window, door and crevice; while assistants going and coming by a muddy pathway...bring mud into the halls and render it impossible to keep the floors in cleanly state...and with steam derricks and cement crushers at work outside the windows, our officers are performing their duties under great difficulties."

By the winter of 1907, they had to move out to temporary accommodations. The time transit and associated clocks were, however, left in their original location until December of 1908, when they were moved directly to their new permanent quarters on Bloor Street.

The School of Science had developed its own little observatory, situated just to the south of the old Engineering Building, roughly where the north door of the Mechanical Building is now. This observatory was used to provide "instructrion to students in geodetic astronomy, or that part of practical astronomy that is practised in connection with a geodetic survey, viz., the precise determination of time, latitude, longitude, and azimuth," as Prof. L.B. Stewart reported in the Engineering Society Transactions for 1905-06:

"The equipment for carrying on this work at present comprises an altazimuth, a zenith telescope, a transit instrument, an electrochronograph, an astronomical mean-time clock, and a sidereal chronometer, as well as other minor accessories, such as an arithmometer for facilitating computations."

The demolition of the Magnetic Observatory coincided with the need for the space for new engineering buildings, so the School of Science observatory was also taken down and a new facility was built on the now-familiar site beside University College, specially designed to accommodate Prof. Stewart's geodetic work. The stone and the basic design came from the Magnetic Observatory, with one fairly obvious change a north-south inversion. To house his in-

continued page8

The Observatory in 1907, partially demolished to make room for the construction of the new Physical Laboratories, as seen from the roof of S.P.S.

Several pits were dug during August to locate the foundations of the 1853 Observatory buildings and the later additions. Here Prof. Dalton is explaining a discovery to Anne Bohyk, part-time student in Anthropology.

Eng. Soc. News

Skule Sports

by June Li

As the regular fall sports season draws to a close and playoffs approach, Skule appears to be strong in many sports. In men's sports, Skule is in second place in Division I football. One game remains, this Monday afternoon against Victoria. The rugger team has a record of three wins and one loss with two games remaining. Playoffs hegin in the first week of November.

The soccer teams are not doing as well. The senior team got off to a slow start. All games were close. Unfortunately, their strong finish was not enough to make the playoffs. However, they hope to build on this year's experience since only two players are graduating and they will he able to count on support from this year's junior team. The junior team showed great spirit hut unfortunately are probably not in the playoffs. Both the junior and senior team coaches commented that they would like to see a greater turnout of freshmen players .

The women's teams are doing excellently. In tennis team douhles, Skule was top in their division and second overall. Soccer is new in women's sports. Engineering has a record of 2 wins, 1 loss, and 2 ties, and has a great chance of making the playoffs. However, this team consists entirely of second and third years and would like to see more freshmen. The foothall team has a record so far of 1 win, 1 loss, and 2 ties, an improvement over last year. The unexpectedly large turnout was almost enough to form two teams. Baskethall has begun and the team has won twice and lost once. After winning the recreational league championsbip last year for the second consecutive year, it was felt that maybe this year the competitive league would he more challenging. This decision was reinforced at the beginning of the season by the increased potential of the team in terms of numbers and talent. For women's sports, there is a calendar of events showing practices, games, and scores in the Chemical Common Room and in the second floor washroom in the Galbraith Building.

Participation in the individual events has been poor. It was not possible to field a team for the women's swim meet last week because too few signed up. The organizers feel that this may have heen because many thought that the meet was extremely competitive. The times for the meet were average and it is more of a recreational than competitive event.

A team of only fourteen was entered in the track meet. However, Engineering did capture the top two spots in the shot put through the efforts of Richard Marini (CIV IV) and Bruce Smith (MECH III). The team commissioner would like to see more come out next year to boost Skule once again to the top.

Other sports starting up are women's hockey and men's volleyhall. Practices in women's hockey have started and a preseason tournament was held Tuesday. In volleyball, the turnout this year has been exceptional. Five teams, compared to last year's four, will be entered in interfac play.

If you have missed the sign-up deadline for any sport but still want to play, leave a message in the appropriate EAA commissioner's mailbox (or, if there isn't one, in the EAA president's mailbox) in the Stores. F!ROSH Don't be shy! Come on out and take a break from the brain grind.

Waterloo to Host OEDC

The University of Waterloo Engineering Society has announced its plans for the 1981 Ontario Engineering Design Competition. Entries for the competition must be received by November 14, and the presentation of projects for judging will take place in March, 1981, at Waterloo.

The competition originated last year at Queen's University. Its main purpose is to provide Ontario undergraduate engineering students an opportunity to improve their practical problem-solving skills, and to promote productive relationships among universities, government, industry and professional institutions. Students may enter in teams of up to four, in one of four categories.

The Entrepreneurial Design category calls for the design of a product or process not presently available in Canada, or availahle only as imported technology. Emphasis in judging will be placed on the difficulty and suitability of the problem chosen, and on the originality of the proposed solution. Also considered will be economic and technical feasibilty, and the quality of the presentation of the project results

The second design category, Corporate Design, involves solving a problem submitted by industry. Problems have been suggested by a number of Canadian companies. Massey-Ferguson Industries asks students to design an air intake system for their farm machinery. The filter must allow sufficient air flow to cool the liquid-cooled engine, yet remove dust and grain chaff that would clog a radiator grid or smother an engine. Obviously, the design must be such that the intake itself does not clog. Another problem, submitted by Standard Brands, would have students 'examine, justify and recommend a total energy conservation program' for the Planter's Peanut factory.

The quality of an entry in the Corporate Design category will be based 80% on the suitability of the proposed soultion, its technical and economic feasibilty, and the originality of the solution. The remaining 20% will be for presentation.

There are also two communications categories in the competition, which recognise the engineer's role in explaining and justifying technology to society. One category is Explanatory Communications and involves the presentation of an objective outline of the issues surrounding a technical topic of social significance. Competition organizers have suggested topics including 'the age of communications', 'financing of public transportation', and 'resource development in the far north'. Entrants are invited to submit their own topics for consideration.

The fourth and final category deals with Editorial Communications. Entrants in this field are required to research a topic and present their view on the matter. This involves formulating a policy, supported

continued page7

Budget Passes

The 1980-81 Engineering Society budget was presented and passed at the Octoher 22 meeting of Council. Treasurer Spiros Pantziris tabled a financial plan that closely followed the preliminary budget passed hy Council last April.

The budget disburses a total of $61,060 in Society funds. The largest portions of this go to administrative expenses such as legal fees, office salaries, audit fees and the like. The Eng. Soc. affiliates, the course clubs and the Engineering Athletic Association receive a total of $17,9000, with $15,600 going to the E.A.A. The hudget includes a surplus of $1100.

The budget received no challenge in Council. Questions were directed at clarifying some of the expenditures, such as "Executive expense" or "President's expense". It was explained that the executive expense includes the cost of two parking passes, at $400 each, for use by Society memhers on Society business.

The president's expense represents costs of a dinner with the Deans of Engineering and Nursing, and a trip to Ottawa. The Carleton University Student Engineers Society incorporated two years ago, and Eng. Soc. President David LeGresley hopes to gain information from them that might have useful application to Eng. Soc. incorporation.

In the budget, revenue from locker sales is listed as $2035. It has heen found that when the Faculty gave the lockers to the Society it was agreed that revenue from locker rentals would be used to purchase new lockers. In this year's budgt, as in the last few years, locker revenue has not been used for this purpose, hut rather lumped in as general revenue.

Treasurer Pantziris says that he was unaware of the agreement. This year's Council is not bound by decisions of previous Councils, and he therefore feels no obligation to amend the budget as passed. He admits the locker plan is a good idea. More lockers are needed, those currently available sell out in a few hours, and more lockers would generate more revenue. It has not been ascertained how much space is available for new lockers.

Policy to be Drafted

Progress is being made on the Society's efforts to revise and update its publishing policies. At a recent Communications Committee meeting, a number of proposals were considered, and a draft policy is now being prepared.

The meeting focussed on more clearly defining the Society's goals for the Toike Oike and the Cannon. According to the policies now in effect, the Toike is responsible for reporting on Faculty and Society events. In reality, however, it no longer performs this role, and this is the reason the Cannon was established in 1978.

The new proposals would make the Cannon responsible for Society news, and allow the Toike to pursue a strictly humourous vein. Both papers, and the Tiny Toike newsletter, would be used to provide publicity for Society events so that Society members can be informed weekly of current events.

Another major facet of the new policy would be a revision of the methods of considering complaints, and the measures necessary to ensure that editors follow the publishing guidelines.

No formal complaint mechanism now exists, but one would be establisbed where the Communications Committee, the Executive Committee, and Council can take action on a complaint. Council will be able to censure, suspend, or remove an editor by a two-thirds majority vote. Presently, removal requires a referendum.

No date was set for a meeting to examine the draft policy.

OEDC

continued from page 6

by research, recommending a course of acton to industry or government. Suggestions from OEDC organizers include an energy strategy, government control of industry, the role of trade barriers and the funding of university research. Once again, suggestions from entrants will be considered.

The entry fee is $20 per contestant, covering the costs of accomodation and prizes. Entries in the design categories are limited to eighteen each, and project expenses up to $100 will be covered by the competition. The Communications categories will cover costs up to $50, and twelve entries are allowed in each of the two sections. Winners in each division receive $500 and a trophy, with second and third places receiving $400 and $300 respectively. All entrants receive a plaque indicative of their achievement and participation in the competition.

Judging will take place the weekend of March 20-22 and the Waterloo Engineering Society expects up to two hundred people to be involved.

Skule Calendars are Coming!

There has been much confusion since the beginning of the term over the Skule Calendar. The calendar is normally part of the Survival Kits purchased by first year students on Orientation Day. This year, however, a number of production difficulties were encountered, and students have still not received the calendars they've paid for.

The calendar editor, Dana Stonkus, was producing the calendar in Belleville, where she was working for the summer. Apparently, due to an error in labelling, a courier shipped the finished calendar to California instead of to the printer in Toronto.

Various attempts to locate the calendar material proved fruitless, and a new calendar editor was appointed in early October. The new calendar was prepared during Thanksgiving week, and is now being printed. The original calendar has never been located.

The Skule Calendar should be available at the Engineering Stores by the end of the month. First year students will be able to claim their copies when it arrives, and extras should go on sale shortly thereafter.

The Establishment

To many people, the heirarchy of the Engineering Society and the Faculty seems insurmountable. Therefore questions go unanswered and problems unsolved. The people listed here are the people in a position to help. To contact one of these people, leave a note in their mailbox in the Engineering Society offices.

The Engineering Society

Simple problems concerning the Society should be directed to your class rep. Students are encouraged to attend Eng. Soc. Council meetings if they feel they have something to contribute.

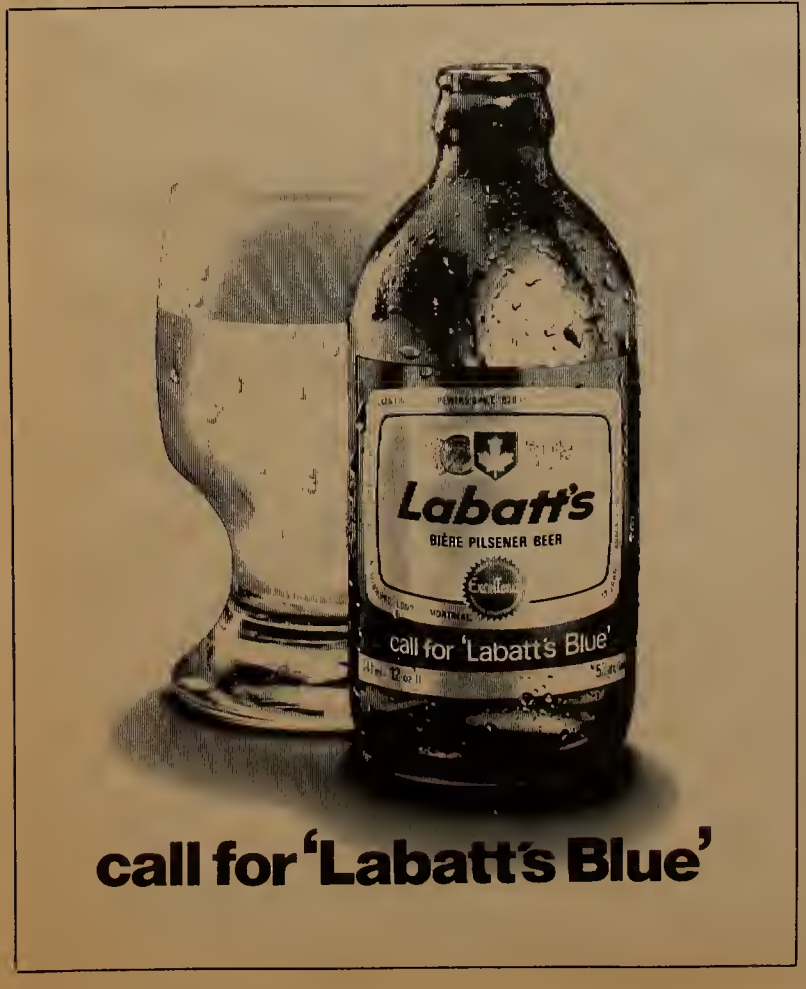
These are the Eng. Soc. people you should know:

President	David LeGresley Mech 8T1
Vice-President Administration	John Byrne Eng. Sci. 8T1
Vice-President Activities	Dave Neale Ele 8T3
Treasurer	Spiros Pantziris Ind 8T1
Secretary	Diane Kapica Ind 8T2
Course Club Chairmen	
Chemical	Richard Brown
Civil	Martin Scott
Electrical	Mike Turback
Eng Sci	Pat Burchat
Geological	Karl Jansons
Industrial	Joe Valerio
Mechanical	Roman Martiuk
MMS	Paul Kolisnyk
Eng. Soc. Standing Committees	
Blue and Gold	Ofer Pittel Mech 8T2
Communications	Al Lechem Civil 8T2
	Randy Sinukoff Chem 8T2
Executive Faculty Council Rep.	Simon Monk Ind 8T1
First Year Committee	Barry Levine 8T4 D
Fourth Year	Brian Baetz Civ 8T1
Employment	Tom Lavrih Mech 8T2
Professional Development	Nancy Brown Eng Sci 8T1
Social	Lynn Wysniak Geo 8T1
Women's	Elizabeth Zurowski Chem 8T2
Executive SAC Rep	Vicken Aharonian Mech 8T2
Speaker of Council	Mike Nettleton Ind 8T2
Engineering Athletic Association	Dale Kerr Civ 8T2
Special Committees	
Constitutional Reform	Mike Nettleton Ind 8T2
High School Liaison	Joe Facca Ele 8T2
	Sean Gregorio Ind 8T2
Others	
Lady Godiva Memorial Band	Steve Roberts
	Emil Joannou Eng Sci 8T1
Engineering Stores Manager	Avi Zimmerman Elec 8T2

Faculty Council

The Faculty Council provides you with representation in the Faculty Office, where decisions are made. Express your concerns to a student member of the appropriate standing committee of the Faculty Council.

Admission	Margie Bawden Mech 8T3
Advanced Standing	Jeff Rosenthal Elec 8T2
Undergraduate Studies	Paul Alves Elec 8T3
	Elizabeth Zurowski Chem 8T2
	Erik Eriksen 8T4 F
	Paul Toyonaga Ind 8T1
Examinations	Andrew Alberti 8T4 B
	Steve Cooper Eng Sci 8T2
Scholarships and Awards	Peter Tumidajski MMS 8T2
Research and Advanced Studies	Fred Dermarkar Mech 8T1
Teaching Methods and Resources	Robert Piane Civ 8T3
	Louise Galizowski Ind 8T3
	Jamie Gerson MMS 8T3
	Stephen Makk Eng Sci 8T4 1
Community Affairs	Richard Marini Civ 8T1
	Cam Berry Elec 8T1
	Mario Petrides Chem 8T3
	Peter Watler 8T4 C
Ombudsman	Glenn MacDonald Geo 8T3



Shop at Honest Avi's

The Engineering STORES

MEMBER BRUTE FORCE COMMITTEE

NEW! 50¢ BFC Buttons

Eng. Soc. Stickers 50¢

BFC Stickers 50¢

Engineering This Month

If you are organizing an event, or know of one, that would be of specific interest to Eng. Soc. members, please drop a short note about it in the Tiny Toike box in the Society offices or contact Ella at 978-2917. It will be listed here free of charge.

Tuesday, November 4
Executive Meeting
The Eng. Soc. Executive Committee will meet in Hart House in the North Dining Room at 5:00 p.m.

Monday, November 10 to Friday, November 14
SAC Preview Days
Guide a high school student through a day of classes in Engineering, and help show what Skule is all about. Sign up at SAC or through your class rep.

Friday, November 14
Ontario Engineering Design Competition
Applications must be received today from entrants wishing to participate in this year's contest at the University of Waterloo. See the Engineering Society for details.

Engineering Night at Dr. John's
The SAC pub in the U.C. Refectory goes Engineering tonight. Drop in for a good time.

Thursday, November 18
Full Council Meeting
All class Eng. Soc. and Faculty Council reps are advised of today's meeting at 5:00 in GB202.

Friday, November 21
Pub
The Eng. Soc. Women's Committee is sponsoring an Engineering Pub in Med. Sci. Lobby. Everyone is welcome—come on out!

Tuesday, November 25 to Thursday, November 27
Skule Nite Auditions
Auditions will be held for the annual Skule Nite revue. Interested people from any college or faculty are welcome to participate. Watch for more details.

Thursday, November 27
Nick Nite
The Mechanical Engineering Club sponsors its annual Nick Nite at the Nickelodeon. Nurses are welcome.

Friday, November 28 to Sunday, November 30
APEO-UES Conference
The University of Guelph hosts this year's Association of Professional Engineers of Ontario Undergraduate Engineering Societies conference. Students interested in attending as Eng. Soc. delegates should contact Professional Development chairman Nancy Brown

Observatory

continued from page 5

struments, a wing was added on the east side, with the necessary slits in the roof, but these have now been covered over. Some of the instruments are still being used; others are in storage in various places. The pier of the time transit of the 'new' observatory is 79,696 feet or 1.0841 seconds of longitude east (and some distance north, of course) of the old one, according to O. W. Martyn who measured it in 1910 as part of his B.A.Sc. thesis on "The Determination of Longitude".

The telescope from the old Toronto Observatory went to the new site on Bloor Street in 1908, and its stone column was levelled two years later and given a plaque of commemoration. This plaque has since been relocated but will be returned to its original place when the landscaping has been completed. The telescope came back to the University in 1931 and was re-installed under its old dome, when the Meteorological Service needed its Bloor Street tower for other for other purposes. After serving many generations of students there, and even doing its bit for the was effort, it was moved to the David Dunlap Observatory at Richmond Hill, where it continues to give good service.

Summer Jobs

CAREERS?!$. Looking for a summer or permanent job? Don't overlook the Career Counselling and Placement Centre. We are now in the middle of our Fall On-Campus Interview Programme. Drop by now to check the job listings or interview schedules.

The following are summer openings listed by the Placement Centre as of Friday, October 24.

Amax Minerals Exploration. First, second, third, and fourth year Geologicals. Deadline November 4.

PetroCanada. Second and third year Chemicals, Civils, Electricals, Geologicals, and Mechanicals. Deadline November 4.

Proctor and Gamble. Third year Chemicals and Mechnicals. Apply by November 4.

Sheritt Gordon Mines. First, second, and third year MMS. DIRECT SIGN UP November 5.

Canadian Nickel. Second, third, and fourth year Geologicals. Application deadline November 5.

Saskatchewan Mining Development Corp. Second, third, and fourth year Geologicals. Apply by November 7.

Atomic Energy of Canada Ltd. Third years, grads, Deadline for applications November 30.

Our get together for your get together.
Molson Pleasure Pack.
12 Export Ale. 12 Canadian Lager. In every case, two great tastes.